WHAT IS CLAIMED IS:

1. A dispersion compensator for compensating for a wavelength dispersion of a transmission medium lying in an optical pulse transmission path, comprising:

at least one dispersion compensating waveguide formed by a photonic crystal in which ununiform elements are introduced into periodic structures of at least two or more types of mediums different in refractive index;

whereby a dispersion property of light that propagates through the ununiform elements of the photonic crystal, is used to compensate for the waveform dispersion.

2. The dispersion compensator according to claim 1, wherein the ununiform elements of the photonic crystal and the periodic structures lying therearound form coupled microcavities, and the microcavities are used to compensate for the wavelength dispersion.

3. The dispersion compensator according to claim 1, wherein the length of an occupied waveguide portion of the photonic crystal in the dispersion compensating waveguide is changed to thereby compensate for the wavelength dispersion.

4. The dispersion compensator according to claim 1, wherein a lattice constant of the photonic crystal in the dispersion compensating waveguide is changed to thereby

compensate for the wavelength dispersion.

5. A dispersion compensator comprising:

light input signal switching means; and

a plurality of dispersion compensating waveguides which are placed side by side on the same plane and have different wavelength dispersions and which respectively have coupled microcavities;

whereby the dispersion compensating waveguides are selected by the switching means to thereby control a value for compensating for each wavelength dispersion in an optical transmission path.

6. A dispersion compensator, at least comprising:

an input-side optical system;

a waveguide array comprising a plurality of dispersion compensating waveguides respectively having different wavelength dispersions;

a drive unit for driving the waveguide array; and

an output-side optical system,

wherein the dispersion compensating waveguides respectively have coupled microcavities, and

wherein the waveguide array is shifted by the drive unit to thereby select the dispersion compensating waveguide through which an optical pulse passes, whereby the dispersion compensating waveguide controls a value for compensating each wavelength dispersion in an optical

transmission path.

7. The dispersion compensator according to claim 5, wherein the coupled microcavities are formed by each of photonic crystals in which ununiform elements are respectively introduced in periodic structures of at least two types of mediums different in refractive index.

8. The dispersion compensator according to claim 7, wherein the lengths of occupied waveguide portions of the photonic crystals in the respective dispersion compensating waveguides are rendered different to thereby control values for compensating for the wavelength dispersions.

9. The dispersion compensator according to claim 7, wherein lattice constants of the photonic crystals in the respective dispersion compensating waveguides are rendered different to thereby control values for compensating for the wavelength dispersions.

10. An optical transmission system comprising:

a dispersion compensator defined in claim 1,

wherein the dispersion compensator is used to compensate for wavelength dispersions in an optical transmission path every wavelengths.